

**METHOD AND APPARATUS PROVIDING AN ADVANCED MIMO  
RECEIVER THAT INCLUDES A SIGNAL-PLUS-RESIDUAL-  
INTERFERENCE (SPRI) DETECTOR**

**ABSTRACT OF THE DISCLOSURE**

A method is disclosed to obtain  $M$  final symbol decisions for signals received through  $N$  receive antennas that were transmitted in  $M$  parallel data layers, using a same spreading code from  $M$  transmit antennas. The method includes space-time equalizing the  $N$  received signals to generate  $M$  output signals from which at least inter-symbol interference is substantially removed and inter-layer interference is suppressed; despreading each of the  $M$  output signals for generating  $M$  soft symbol estimates; and processing the  $M$  soft symbol estimates to derive  $M$  final symbol decisions that are made in consideration of modeled residual inter-layer interference present in the space-time equalized  $M$  output signals. Processing includes operating a signal-plus-residual-interference (SPRI) detector that operates in accordance with a maximum likelihood (ML) technique, while space-time equalizing employs a linear minimum mean-square error (LMMSE) criterion. Transmitting may occur at a base station having the  $M$  transmit antennas, and receiving may occur at a mobile station having the  $N$  receive antennas.